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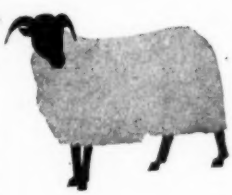

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Refresher Article No. 3

Mastitis Caused by Bacterial Infection

BY

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Incidence

THE frequency of clinical mastitis to-day is not thought to have been reduced by the application of antibiotics for treatment. While it may be said in comment that this is hardly to be expected from the use of a therapeutic agent applied in clinical cases alone, it is also true to say that by the same measure, clinical disease due to *Str. agalactiae* can now be totally eliminated by a policy of eradicating this organism from the herd.

In recent years only 2 field surveys have been conducted into the occurrence of clinical mastitis in dairy herds. Hughes (1954) reported a case incidence of 13.5 per cent. in one practice in the Midlands during 1951 and 14 per cent. during 1952, while Withers (1955) reported incidences of 8.1 per cent. and 7.1 per cent. during the same years amongst cows in 3 southern counties. More recently, Withers (1957) published figures of 9.8 per cent. and 11.5 per cent. respectively for the occurrence during the years 1952-3 and 1953-4. It would be a fair estimate, therefore, to state that about 1 cow in every 10 shows symptoms of clinical disease and that the proportion has remained fairly constant in the last few years. Two points of criticism may perhaps be made of the evidence accumulated from field surveys; first, they depend on the interest shown by the farmer in keeping records even of the cases treated by his veterinary surgeon, and secondly, on the definition of the term "mastitis." It may be supposed that it is the obvious clinical case suffering from an inflamed udder which is recorded as a case of mastitis in these surveys, while the subclinical case where there is nothing more than "thick" milk will not be considered under this heading. When the term mastitis embraces these minor abnormalities, then the extent of disease may be considerably higher than the figures quoted and, in the writer's experience, may reach 20 per cent. of cows affected each year.

Due to the absence of published information it is difficult to appraise the relative importance of the different organisms in the causation of mastitis. Hughes (1954), in addition to giving figures for the overall yearly incidence of mastitis during 1950-2 as 14 per cent., classified the 584 cases encountered according to the types of infection responsible for the disease as follows: *Str. agalactiae*, 24 per cent.; *Str. dysgalactiae*, 11 per cent.; *Str. uberis*, 17 per cent.; *Staph. aureus*, 12 per cent.; and *C. pyogenes*, 8 per cent.; 4.9 per cent. were free from organisms, and the remainder were of indefinite causation. For the same period, Stableforth (1953) gave the following data for the analysis at Weybridge of 2,000 clinical cases: *Str. agalactiae*, 9 per cent.; *Str. dysgalactiae*, 8 per cent.; *Str. uberis*, 12 per cent.; *Staph. aureus*, 18 per cent.; sterile samples, 27 per cent., and the remainder due to various organisms. These surveys show that up to 5 years ago no one organism could be said to cause significantly more disease than another. But, since that time, many herds have been freed from *Str. agalactiae*, so that interest now attaches more to the rôle of the various organisms in the herds freed from this organism and, unfortunately, there is little published information in this respect. In the writer's experience, which has been mainly confined to 3 free herds containing about 300 milking cows, about 60 cows affected with varying degrees of mastitis have been noted annually. Of these, 25 (41 per cent.) were due to *Staph. aureus*, 10 (16.5 per cent.) to *Str. uberis*, 17 (28 per cent.) to *Str. dysgalactiae*, 5 (8.5 per cent.) to *C. pyogenes*, 1 (2.5 per cent.) to *Bact. coli*. In this small sample

of cows, therefore, it is clear that *Staph. aureus* is the most common organism associated with clinical disease in herds free from *Str. agalactiae*.

Forms of Mastitis

Due to staphylococci. It has been observed that the infection rate with *Staph. aureus* may be as high as 50 to 60 per cent. both in herds in this country and in America (Schalm & Woods, 1953); at the same time the clinical rate may not exceed 8 to 10 per cent. It can be shown by appropriate tests, however (*e.g.* the Whiteside test), that more than half of the infected cows secrete abnormal milk, so that staphylococcal infection in a herd may cause a fairly widespread subclinical form of mastitis resembling that caused by *Str. agalactiae* in addition to the occasional clinical case.

There is no doubt that the infection rate increases with the age of the cow, and it can be shown that there is a corresponding increase in the level of staphylococcal antitoxin in the blood. This suggests that there may be resistance increasing with age to the toxic effects of udder infection and this might also explain the relatively low incidence of acute staphylococcal mastitis in herds where infection of the udder is fairly high. Schalm and Woods (1953) have advanced the view that cows develop a resistance to this organism and that there is a competition for dominance of the udder flora between the various micrococci and streptococci once *Str. agalactiae* has been removed from the herd. They state that in large machine-milked herds in which extensive use of antibiotic therapy has been made, *Staph. aureus* has become the major organism of concern in the mastitis complex.

Clinical mastitis due to staphylococci usually occurs within the first week after calving and this form of mastitis probably accounts for the relatively high incidence of total cases observed by Withers (1957) to occur soon after calving. It is possible to recognise various kinds of staphylococci pathogenic for the udder by methods of phage typing and other distinguishing tests. The majority of strains recovered from subacute cases occurring in early lactation belong to a well-defined 42D phage type while strains of different type are present in cases of acute mastitis which may occur at any time in lactation. Since these latter strains produce only small amounts of toxin *in vitro* their injurious effects must be due to the intensive local reaction which they produce within the udder tissue. Although these strains are not on the whole so prevalent as the common 42D type, it is possible that in certain herds they may cause more infection than in others, thus accounting for the frequency of acute mastitis observed by certain practitioners.

Due to streptococci. The chronic insidious nature of mastitis caused by *Str. agalactiae* has been frequently described in the literature and its presence in the herd may be suspected when cows are showing abnormalities in the fore-milk together with a fair number of light quarters. This form of disease has undoubtedly been reduced in recent years by the application of penicillin, with the result that other streptococci such as *Str. dysgalactiae* and *Str. uberis* have assumed greater importance. Infection by these two latter organisms is generally sporadic though there may be a low carrier rate of up to 10 per cent. in the herd. In such carriers there is very little disturbance in the milk and it is more usual in the case of *Str. dysgalactiae* to find that it is responsible for a sudden, swollen quarter accompanied by a clotted secretion. The swelling may be resolved within a few days if frequent stripping is practised but some atrophy of the tissue of the affected quarter is usually produced.

Due to other organisms. Bact. coli and a capsulated variety of this organism known as *Klebsiella* may occasionally cause either an acute or subacute form of mastitis. In the acute form, the udder is greatly swollen and there are constitutional symptoms; the affected quarter may develop an abscess in the tissue which, on rupture, discharges a greenish-yellow pus. Infection with *C. pyogenes* progresses usually to a suppurative and gangrenous form of mastitis more especially in dry cows which have been left unattended at pasture (Fig. 1). There is now support from experimental evidence that infection is transmitted by means of flies (Parish, W. E., & Stuart, P., personal communication). This view has been held for many years because of the seasonal occurrence of summer mastitis and because the condition is seen more frequently on farms which are well wooded. It would seem that conditions are also favourable for its occurrence in a wet summer such as the one of 1954, when there was a very high incidence in certain districts. According to Withers (1957), the average yearly incidence does not exceed 0.5 per cent., but the total cases in 1954 were at least ten times as many.

Though generally known as summer mastitis due to its frequency in mid-summer, there is no doubt that cases of mastitis caused by *C. pyogenes* appear in spring calving cows which have been dry during the winter months. It is difficult to explain the mode of transmission in these cases by the same means as the true summer cases, or why they should be as numerous as the latter on certain farms. It would appear that this form of mastitis is sometimes due to a mixed infection, and it may well be that *C. pyogenes* plays the part of a secondary invader. Occasional cases of subacute mastitis due to acid-fast organisms belonging to the species *Myc. lacticola* (*Myc. smegmatis*) have been observed (Stuart & Harvey, 1951). They are thought to be due to the accidental introduction of the organism at the time of injecting the udder with therapeutical substances included in an oil base.

Diagnosis

A differential diagnosis of acute mastitis may be made by clinical examination of the udder supported by a history of its onset in relation to the stage in lactation. As has been stated earlier, the more frequent condition due to staphylococci occurs at, or near calving, while other affections arise usually during lactation.

Diagnosis of chronic or subacute mastitis is made

FIG. 1.—Summer Mastitis. Advanced case showing oedema and sloughing of the skin of the udder.

FIG. 2.—Typical $\alpha\beta$ staphylococci on blood-agar containing low antitoxin content.

by examination of the secretion in order to detect the presence of clots, and of the udder itself for the presence of any swelling or induration at the time of milking. This requires a careful routine practice by the dairyman in charge who may use the strip cup before each milking, although this practice is subject to the disadvantage that it is a means of transmitting infection from cow to cow. As an alternative, strip cup examination should be carried out as soon as the cow is brought into the milking line after calving. Afterwards, the detection of abnormal clots in the milk may be made by carefully observing the cloths placed either over the collecting churns or in the strainer through which the milk flows before passing over the cooler. The location of the affected cow then follows by examining with the strip cup the fore-milk of the group of cows last milked.

Early diagnosis of affected cows on these lines is to be recommended for adoption as a routine because it enables therapeutic treatment to be applied in the initial stages of the disease.

The detection of infection by means of a bacteriological test in the laboratory must be made either to detect infected cows when a policy of eradicating *Str. agalactiae* is to be adopted, or to enable the correct choice of antibiotic to be made in dealing with a specific infection in individual clinical cases. It may be mentioned here that the detection of staphylococci is best made by plating milk samples (usually gravity cream) on the surface of agar containing 5 per cent. ox blood of known low α and β antitoxin content (see Fig. 2).

It is probably a common practice at present to use penicillin for the general treatment of mastitis but it would be an advantage to check the nature of the common causal organism involved in the herd in order to verify that it is sensitive to this antibiotic or any other in use. In the laboratory, tests on samples of secretion should, therefore, aim not only at identifying the causal organism but also at ascertaining its sensitivity to the various antibiotics. In the past, various tests, *e.g.* the Hotis or Whiteside tests, have been employed as aids to detecting infection, but nowadays their application does not give a full answer to the information required in diagnosis.

Control and Treatment

There is now sufficient evidence to indicate that herds can be freed from infection with *Str. agalactiae* and that they can be maintained free provided that no infected cows are introduced. The success in dealing with this infection is due mainly to two factors—firstly, the organism, being highly sensitive to penicillin, is destroyed within the udder in a large proportion of treated cows and, secondly, the organism is relatively short-lived in the unabraded skin of the udder. It would be a great advantage if herds, once freed from infection, could be maintained in this state by creating, through vaccination, sufficient immunity to prevent re-infection, but no information on this point has so far been gained.

A plan for eradicating infection with *Str. agalactiae* has been detailed recently (Report ARC. 1955) and the methods advocated should be followed closely. One or two of the important details only will be emphasised here. In general, it is better to delay the programme till the early summer especially in herds where cows are prone to be affected with sore teats because these constitute a focus of persistent infection for the re-infection of treated cows. When infected cows have been detected by a bacteriological test they should be treated with two doses of 100,000 units penicillin with an interval of 3 days between the injections. A subsequent test at 6 weeks after treatment may reveal a small number of infected cows but following further treatment of these, infection should either disappear or be reduced to a very low level. There is evidence to show that certain factors contribute to the success attained in clearing herds of infection. It has been found, firstly, that the best results are obtained in herds in which there is no hand stripping, and, secondly, that infection is eliminated more quickly when a suitable disinfectant is added to the water used for washing cows' udders before milking. The latter practice need only be employed for a limited period depending on the progress made in eliminating infection, and it is preferable to use separate sterile cloths for each cow immediately before milking as a permanent routine.

Certain isolated attempts have been made at eliminating *Staph. aureus* infection in the same way, but they have not met with the success achieved with *Str. agalactiae*. The results have shown that it is more difficult to remove staphylococci from the udder by intramammary treatment, and that rapid re-infection with *Staph. aureus* takes place unless very stringent measures are taken to prevent its spread. Also, it has been found that cows with old-standing infection of the udder are difficult to cure, which suggests that the organism may invade the alveolar tissue of the udder and therefore be out of contact with a therapeutic agent injected *via* the teat. It must also be borne in mind that strains of staphylococci resistant to penicillin are to be found, so that it is necessary to check the sensitivity of the organism found in the herd.

Until further encouraging results are obtained, either from a therapeutic or preferably an immunological method for the control of staphylococcal infection, the only recommendations that can be made are the early treatment of clinical cases together with the employment of efficient methods of milking which will assist in preventing the onset of subclinical mastitis in an infected herd. These methods will be dealt with in greater detail in considering the proper management of the milking machine. It may be mentioned here, however, that probably the greatest contributory cause of mastitis at the present time is the machine which is allowed to operate on the teats for too long. This results in a certain amount of damage to the sphincter and epithelial lining of the teat canal, and this is most likely to happen when the milker is assigned the care of too many units. It is the opinion of several observers

(*Concluded at foot of page overleaf*)

Parturition in the Thoroughbred Mare with Particular Reference to Blood Deprivation in the New-born

BY
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SUMMARY AND CONCLUSIONS.—We have studied the events occurring during 61 Thoroughbred parturitions because we felt that some specific happening or practice at that time might condition the development of convulsive and wandering foals.

At Newmarket we found that traction and early severance of the umbilical cord are almost universal practices. Severance of the cord may occur even before a respiratory rhythm is established or before air inflation and erectile expansion (Jäykkä) have had time to occur.

This is an unlikely event during an unassisted birth except in rare cases where parturition occurs whilst the mare is standing or where she is frightened and gets up immediately after delivery. In both these cases, however, the effect of gravity might cause a considerable quantity of blood to pass into the foal very quickly and, at the same time, stretching obliterates the umbilical arteries.

As a consequence of early severance of the cord the newborn foal is commonly deprived of 1,000 to 1,500 ml. of placental foetal blood, whereas under "natural" conditions the amount concerned is probably well under 200 ml.

It is suggested that apart from the possibility that specific syndromes might sometimes be precipitated by this blood loss, the general interests of the animal are better served when they are allowed to regain the blood, as they almost always do under natural conditions.

Since the umbilical cord has a point at which it will rupture normally after a period during which mother and foal rest, and since haemorrhage from either end of the severed cord is then extremely rare, it is suggested that the cord requires no human attention after a normal birth.

IN a study of convulsive and allied syndromes in new-born foals Mahaffey and Rossdale (1957) could only verify their existence amongst the progeny of Thoroughbred mares which had foaled indoors, under supervision and subject to varying

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Mastitis Caused by Bacterial Infection.—*Concluded.*

that this is the most common form of abuse of the machine and may lead to the establishment of clinical disease due to organisms which are not ordinarily pathogenic for the udder such as those of the Klebsiella species (Parker & Harrison, 1956). Finally, it is to be recommended that the younger cows in the herd be milked first, since infection is seen mainly in cows in their late second and third lactation.

Regarding the treatment of clinical mastitis due to staphylococci, various single antibiotics and combinations of them have been tried and they have usually given similar results. Early cases affected with sensitive organisms are found to respond satisfactorily when penicillin is employed, although it is unlikely that sterilisation of the gland is effected in all cases. It is the opinion of certain practitioners that one antibiotic gives better results than others in some herds, so that it is advisable to submit each for trial before selecting the antibiotic for general use on a particular farm.

The prevention of *C. pyogenes* infection by the use of a vaccine or toxoid has not proved satisfactory and therefore attention has been given to the prophylactic use of a therapeutic agent when injected into the teat. The results obtained from the limited trials that have so far been made are promising, and therefore it may be recommended that two doses of procaine penicillin (300,000 units) suspended in mineral oil be injected with an interval of three weeks into the teats of cows that are dry during the summer. The problem of how to deal with those cases occurring in the winter might be overcome in the same way by injecting, as a routine, the teats of all cows as they are dried off. This seems to be a form of treatment which might at least sterilise the gland of various organisms which seem to act synergistically with *C. pyogenes* in the initiation of suppurative mastitis. In addition to this treatment, it is advisable to examine the udders of dry cows daily by bringing them into the cowshed with the milking herd. When the condition is observed at its onset it is sometimes possible to prevent it reaching the acute stage by intensive intramammary treatment, with the result that, in some cases, it is possible to effect a satisfactory cure resulting in a normally functioning quarter.

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degrees of interference during parturition. Furthermore, experienced equine practitioners had said again and again at meetings over a period of 25 years that "barking," convulsions and wandering were exclusively diseases of the Thoroughbred and we had not seen any records nor met with any cases in breeds which foal in open fields. Recently we performed an autopsy on an Arab foal which developed severe convulsions within minutes of birth but it was born in a foaling box, subjected to assistance during delivery and subsequently to very early severance of the umbilical cord. We have verified by personal inquiry and observations that the syndromes exist amongst new-born Thoroughbred foals in France and Italy where foaling methods are very similar to those at Newmarket. Conversely, similar conditions appear to be completely unknown in Australia where Thoroughbred mares usually foal without human assistance, in large paddocks.

It seemed to us that a close study of parturition under the rather special conditions prevailing in Thoroughbred studs at Newmarket might, in some way, lead us to a better understanding of these very interesting pathological conditions. Accordingly, one of us has been present at 61 foalings in the Newmarket district whilst the other has seen births under representative conditions in England and France and has questioned stud attendants very closely in Italy.

Apart from general accounts in the standard textbooks of veterinary obstetrics there have been two descriptions of parturition in the mare in English veterinary literature in recent times. Wright (1943) was present with 8 Suffolk mares during parturition whilst Tutt (1944), from a consideration of 69 Thoroughbred foalings, correlated "as far as possible the various phenomena associated with the parturient mare." Both descriptions were largely concerned with the physiology and behaviour of the mare at the termination of pregnancy whereas our main concern, at all stages, has been with the foal. We have been anxious to see the ways in which a natural and apparently simple though perfectly co-ordinated act might be altered by human interference and to study the possible consequences of the latter for the newborn.

Description of Parturition in a Confined Space

At Newmarket studs, mares considered near foaling are brought into special boxes where they can be kept under constant observation in order that experienced persons may be present during parturition.

The foaling box is spacious, warm and well bedded with straw. It is situated next to a "sitting-up" room. In the dividing wall there is a conveniently placed sliding panel through which the mare can be observed without the necessity of entering the box and so disturbing her.

Premonitory Signs

Mammary development (in conjunction with the last date of service) is the sign most looked for in predicting the proximity of foaling. The udder increases in size, wax generally appears on the teats and sometimes there is actual secretion of milk for several days (or more) before parturition. Tutt (*loc. cit.*) observed hypertrophy of the udder as early as 6 weeks before but he agrees with Wright (*loc. cit.*) that foaling usually follows within 48 hours of the appearance of wax on the teats. These signs are generally but not always apparent and the time interval between their appearance and the onset of parturition is very variable. Every season there are a few mares which foal unattended because they show no definite premonitory signs. Well over 90 per cent. of Thoroughbred mares at Newmarket foal during the night and our personal observations confirm that this is generally so at most of the breeding centres in Western Europe; as a consequence the most constant watch is maintained over the selected mares after dark. It is quite uncommon for mares to foal in a field, unexpectedly, during daylight.

The immediate onset of parturition is usually heralded by uneasiness and patchy sweating. Restlessness is a constant sign. Some mares walk slowly around the box, occasionally lifting the tail; others are more agitated, paw the ground, sweat profusely and might be thought distressed, although from time to time they eat. This period is extremely variable in duration, it may last minutes or several hours. It may even pass off without parturition occurring for some days and during this interval there may be a number of similar "false alarms."

The Act of Parturition

Parturition definitely begins with the rupture of the allanto-chorionic membrane and the escape of allantoic fluid. Stud grooms refer to this as the "breaking of the water" and they take it as the signal that parturition has commenced. It usually occurs whilst the mare is standing. In rare instances the unbroken placenta protrudes through the vulva and can be seen as a tense red membrane which is surprisingly difficult to rupture with the fingers. Some stud grooms are of the opinion that the foal will be stillborn if the placenta is not artificially ruptured immediately on these occasions. In the present series we only saw one such case so we are unable to comment upon the accuracy of this belief, perhaps it contains an element of truth if the appearance of the placenta at this stage indicates its early and rapid separation.

The fluid escaping after rupture is not unlike urine in appearance. At first it is eliminated noisily in small quantities, especially when the mare moves about the box but it is not long before she becomes recumbent and in so doing a large quantity is voided as the hind quarters meet the ground. The cervix is dilated, straining is in evidence and strong uterine contractions force the forelegs of the foal into the vagina. In a very short time the amnion is visible as a bulging, shiny, intact membrane between the lips of the vulva.

Soon after the mare has broken water the stud groom makes a manual examination to ascertain the type of presentation. He is usually very experienced in these matters and does the job quickly and efficiently. He satisfies himself that everything is normal and then is content, in most cases, to watch proceedings for a time through the panel in the dividing wall. If delivery appears to be proceeding quickly and easily there is usually no further interference until

the head is clear of the vulva, unless the mare's hind quarters become apposed to a wall. In this case she is made to get up and change her position.

Early expulsive efforts usually commence with the mare sitting on her sternum, the hind legs flexed. These efforts are at first infrequent and during the intervals she often nibbles at straw and periodically looks around at her flanks. Although individual behaviour varies considerably, most mares get up when the forelegs pass the vulva and the foal's muzzle is just visible, excitable mares may get up and down repeatedly, especially if disturbed by men entering the box or by unusual sounds.

The position of the foal during delivery offers a minimum of resistance in relation to the mare's pelvis. It is completely covered by amnion which, in a natural birth, is not broken until the foal ruptures it by its own movements after delivery. One foreleg is retarded slightly (to the level of the other fetlock) with the result that the corresponding elbow tends to pass through the pelvis behind the other. The head is extended and sometimes partly rotated. It lies between or slightly to one side of the two forelegs. A fold of amnion, in which a large proportion of amniotic fluid collects, normally hangs from between these protruding limbs. Sometimes the elbow of the retarded foreleg appears to be held within the vagina so that the hoof lies level with the opposite cannon bone or knee. This seems to make delivery very much harder for the mare. The limb is usually pulled forward by the groom, apparently beneficially, because it appears to result in a quicker and easier birth.

In 97 per cent. of cases the final expulsive efforts are made whilst the mare is recumbent, lying on her side with the limbs extended.* (Of the 61 mares we observed, only 2 foaled in the standing position.)

These are very powerful efforts indeed and they continue until the foal's hips are delivered and only the hind legs remain in the vagina, then they cease abruptly. On various occasions we saw mares make short, rapid, semi-rolling movements which gave us the impression of being deliberate attempts to "shake" the foal into an easier position for delivery. Once delivery has been effected the mare usually rests on her side for a minute or two then regains sternal recumbency: she may remain for many minutes in this position, nibbling at the straw or turning her head towards the foal, sometimes she calls to it.

Events after Delivery

A few mares get up very quickly after the birth is completed. The tendency to do this seems to be influenced by the presence of men working behind them (especially if a previously stitched vulva has just been cut), by the attention being devoted to the foal or by sudden noises such as voices or the rattling of buckets.

Of 59 mares which foaled in the recumbent position, 3 got up immediately afterwards. With one of these, there were 5 people in the box at the time. The other 2 were stitched mares. Two mares remained recumbent for one minute only, three for 2 minutes and the remainder for at least 5 and up to 20 minutes.

It appears to be the normal, natural behaviour of the Thoroughbred mare to rest for quite a prolonged period after parturition and since the foal, too, is usually inactive for at least part of this time, the umbilical cord remains intact for a lengthy period if it is not interfered with by man. It is reasonable to assume that this is of considerable physiological importance and, as we shall show later, it certainly leads to a great difference in the amount of blood which finally passes from the placenta to the foal and therefore to the latter's blood volume.

Occasionally mares exhibit some degree of pain during the rest period and this causes them to roll but the cord was broken by this activity only twice in our series. When finally on their feet, mares commence tending the foal. They lick it vigorously for a prolonged period; this very powerful instinct is virtually impossible to suppress and if, for any reason, mares are denied access to their foal, most of them lick the attendants. Some bite at the new-born and strike at it gently, especially if it seems lethargic. Stillborn foals are ultimately pawed quite forcibly with the forelegs.

Later, whilst the foal is making efforts to get up, many mares eat straw or hay. Some go down again, especially if the afterbirth is not quickly expelled. In most cases separation of the placenta commences soon after delivery and it is usually complete within the hour. Immediately after its expulsion many mares exhibit some degree of pain. We have never seen any attempt to eat the afterbirth.

Obstetrical Procedures Employed by Stud Grooms

Stud grooms generally commence interference during a normal delivery when the head is emerging from the vulva. They enter the box, break the "bladder" (amnion) and peel it back from the head. The forelegs are held and the foal eased out of the mare.

If the groom considers that delivery is prolonged or difficult as, for example, in cases where the mare is getting up and down repeatedly or when her efforts are apparently producing little or no result, greater traction is exerted on the forelegs, sometimes two men pull together. The "help" given usually coincides with the mare's efforts, and on the whole appears to be applied intelligently. The main aims seem to be to reduce the efforts required by the mare and to have a live foal on the ground as quickly as possible, unharmed in any way and breathing normally. On general principles there should be no necessity for the assistance of man in the great majority of parturitions in any species and there can be no doubt that traction is frequently applied unnecessarily during many Thoroughbred births. However, it must be admitted that it is generally practised without any untoward effects being obvious and the basic aims of the groom are achieved in most instances.

* We counted the number of expulsive efforts made from the time of appearance of the amnion in 5 instances, they varied from 60 to 100.

We have been unable to come to any definite conclusions, firmly based upon actual data, as to the dangers or ill effects of providing some assistance during the foal's passage through the pelvis and vagina. We have been primarily concerned with what happens when this stage is completed and the umbilical cord is attended to. The effects, if any, of traction require a separate investigation for it is possible that its consequences are not always as harmless as they may appear to be to the unlooker. When it is continued into the act of dragging the new-born to the mother's head, for example, it causes rapid and premature rupture of the umbilical cord. Interference with the position of the legs by pulling on one or both whilst the elbows are in the pelvis may expose the chest to injury and may even be associated with many cases of fractured ribs which we see in foals coming to *post-mortem* examination from various causes.

In the present investigation it was found that very little time (never more than 5 minutes) elapsed between the breaking of the water and the appearance of the forelegs at the vulva. The time taken from this stage to complete delivery was much more variable but, obviously, any assistance which is given must speed up parturition, often markedly so, even in some of the otherwise very easy births.

The amnion is almost always ruptured prematurely by the groom; this appears to coincide with or to actually provoke the initial respiratory efforts of the foal. As the head of the latter leaves the vulva it drops down towards or into the pool of amniotic fluid which we described earlier. Great care is taken to prevent the foal's nostrils falling into this, but, under natural conditions we can hardly believe such contact could cause harm to a normal foal nor do we think that a viable individual could be asphyxiated by the presence of unruptured membrane over his nares.

After delivery and severance of the cord it is universal practice to tie the amnion into a knot and then attach it by twine to the maternal end of the cord so that it hangs at about hock level. Grooms inform us that the objects in view are to prevent tearing so that the additional weight will assist in the earlier expulsion of the afterbirth! They also state that some young mares appear to resent its presence if it is allowed to dangle about the lower part of their limbs.

Although we have reached no definite conclusions here as to the exact significance of traction, of hastening delivery or of early artificial rupture of the amnion it is otherwise with the umbilical cord because we have obtained such clear evidence that the current obstetrical methods often deprive the foal of a large quantity of placental blood and, on general grounds alone, the undesirability of such a deprivation is hardly contestable.

The Umbilical Cord

During the final expulsive efforts of the mare the hind legs of the foal are never completely delivered; they are usually left to the level of the hocks and if there is no human interference the umbilical cord remains intact. The foal then appears to be "anchored" to the mare (by the cord) and we have gained the firm impression that its efforts alone are generally insufficient to break the connexion during the first 10 minutes or so after parturition. We believe that under natural conditions the act of the mare getting up is primarily responsible for severance of the cord. If they are allowed to do so, both mother and the new-born sit quietly for many minutes after the birth. In Thoroughbred practice this is infrequently permitted.

We were able to make a close examination of the intact cord after delivery in all but 3 (Nos. 15, 16 and 17) of 61 mares. In order to do so we peeled back the amnion immediately the hips were delivered. The cord was then taken in one hand. Of the 3 mares in which this was not possible 2 (Nos. 15 and 16) foaled in the standing position and the cord ruptured as the foal fell to the ground. In No. 17 there was a particularly forceful final expulsive effort, supplemented by traction on the forelegs of the foal by the stud groom and the cord broke spontaneously.

In 58 instances the cord remained intact for a variable period after parturition. It was subsequently severed in one of a variety of ways.

(i) By the mare getting up (7 cases): three (12, 13 and 14) within seconds of delivery, two (24 and 25) at one minute and two (26 and 27) at two minutes after delivery. In two cases (28 and 37) the cord broke when the mare rolled over on her back.

(ii) By the activity of the foal. This happened in only two cases, in one (19) (at one minute) the movements of the foal's feet in the vagina appeared to be the factor responsible for severance whilst in the other the placenta was pulled from the mother by the foal at 15 minutes in its efforts to get up and the cord broke spontaneously 3 minutes later.

(iii) By man.*

(a) Twenty-six cords were cut with scissors, usually after ligation (one after complete placental delivery) at varying intervals after the birth of the foal.

(b) Nineteen were broken by hand.

(c) One was broken as the foal was dragged to the mother's head.

These do not represent the relative frequency with which such methods are adopted to deal with the cord at Newmarket and in Thoroughbred practice generally. It is quite a common procedure to pull the foal by the forelegs to the mare's head, an action which is often virtually a continuation of the traction applied to the foal during the later stages of parturition. This practice leads to the earliest rupture of the cord and it may occur as the hips leave the pelvis or only a second or two later. On studs where this is not the routine, attention to the cord is usually treated as a matter of great urgency, almost as though the foal's life depended upon breaking it.

* Most of our observations were carried out on two studs and only six studs in all were involved for the purposes of the specific recording of events. In many instances we were able to make minor alterations in the established practice of dealing with the cord to suit our investigation.

The task is usually accomplished in *well under* 30 *seconds*—the shortest time that can possibly be taken to locate and deal with the connexion between mother and foal. Many grooms grasp the cord firmly and cause severance with a strong pull, others ligate it about 3.5 cm. from the abdomen of the foal and cut with scissors on the distal side. Sometimes two ligatures are placed on the cord 3 or 4 inches apart and a cut is made between them. Yet another common variation is to cut without ligation.

The equine cord is a strong structure. While still joined to the umbilicus the length which lies outside the vulva varies from 18 to 45 cm. Its thickness is variable at ca. 14 cm. from the umbilicus, the circumference is ca. 8 cm. when the vessels (especially the vein) are distended with blood. It resists a high degree of tension, and requires a strong pull to break it.* Most stud grooms appreciate this and, fearing injury to the foal, they place one hand firmly on its abdomen before attempting to break a cord by traction. There is a "natural" point of rupture about 1.5 cm. from the umbilical ring, the cord almost invariably breaks here when allowed to rupture spontaneously or when it is broken by traction but it is hardly ever cut at the "correct" point by grooms.

After natural spontaneous rupture the arteries recede out of view and a lengthy piece of umbilical vein is left protruding from the navel. This dries and shrivels very rapidly and ultimately drops off.

The amniotic portion of the cord contains two arteries, a vein and an allantoic duct. There is a variable quantity of Wharton's jelly and the vessels are well clothed with connective tissue. Whilst still intact the vein is easily distinguished as a soft non-pulsating, bulging vessel at least twice the size of either artery. The latter can be felt as rather hard, cord-like structures, one is often thicker than the other, sometimes markedly so. Immediately and for some time after delivery there is always pulsation in one or other artery, often in both. In our series, pulsation persisted for from 30 seconds to 7 minutes (average 2 minutes) in eighteen cases where the cord was left intact until pulsation finally ceased.

The quality of the pulsations varied considerably. It was often very strong and if the cord were allowed to rest upon the ground it could be seen throbbing from some distance away. In these cases especially, fremitus could often be felt soon after delivery. Over a period of minutes pulsation gradually became weaker and in those cords which were allowed to remain intact it ceased quite abruptly. In a few instances it was very weak from the beginning and even difficult to feel or see immediately after delivery.

In 15 cases the rate of pulsation was recorded immediately following birth. In every case it coincided with that of the heart. The average was 81 per minute with a range of from 40 to 150. There was marked arrhythmia in 3 cases. In another 3 where the rate exceeded 100 per minute the mares were of an excitable nature. In one case where 142 per minute was recorded the mare had walked around the box sweating profusely for 45 minutes before the breaking of the water.

* We saw one mare get up whilst the cord was still intact. She staggered under the resulting drag before it broke.

Blood Deprivation

During the present investigation we have been very much concerned with the amounts of placental blood which can be collected from the cut or broken cord, and we have been particularly interested in how differences in these quantities might be directly related to the time after delivery at which severance takes place. In our series this has happened in from a few seconds to 18 minutes after birth. Just before severance, the cord was grasped very firmly to prevent any blood escaping from the placental end on to the ground. The collections were made carefully into a graduated container, blood being allowed to drain into it until the flow ceased. Then the cord was "milked" several times to expel any residual blood from the part outside the vulva. The total quantity was recorded when we were satisfied that no more could be obtained. We believe that the figures for the collections represent the quantity of blood retained in the placenta under some pressure and available to the foal if the cord is allowed to remain intact for a sufficient length of time. It is not, of course, the total amount of blood retained in the placenta although in dissecting the placental vessels subsequently we were never able to collect more than 50 c.c. of free blood from the lumen of the major cord vessels.

In 40 cases where we obtained collections the following were recorded (the individual figures are set out in Table I).

(a) Cord cut immediately, *i.e.* within seconds, after birth, 11 cases.

Average quantity of blood obtained—1,020 ml.
range: 1,500 ml.—660 ml.

In one case, only 480 ml. was collected but an unknown quantity escaped onto the ground. In most of these cases there was a strong gush of blood from the severed end of the vein (on the placental side), it often spurted to several feet away. Subsequently the force diminished until only a steady stream emerged but compression of the vein resulted in a build-up of pressure again and this effect could be repeated more than once. On some occasions the cord continued to pulsate after severance.

(b) Cord cut whilst still pulsating 1 to 5½ minutes *post partum*, 14 cases.

Average quantity of blood obtained—390 ml.
range: 900 ml.—130 ml.

(c) Cord cut after pulsation had ceased, 1 to 7 minutes *post partum*, 19 cases.

Average quantity of blood obtained—170 ml.
range: 240 ml.—10 ml.

We were able to make an accurate collection from only one case where the mare foaled in the standing position and this amounted to 600 ml. In each of 4 cases where the mare got up immediately after expulsion of the foetus an unknown quantity of blood escaped onto the floor and we were unable to obtain reliable figures for the quantity of which the foal was deprived.

Potential Significance of Blood Deprivation

One can estimate fairly accurately, if to some extent theoretically, what is entailed in depriving the

new-born foal of a large quantity of blood. This is not to say that any specific syndrome will or might arise as a consequence because, within limits (not always defined) the new-born of any species appears to be remarkably adaptable to many adverse occurrences.

We found, in 17 cases, that cord blood contains, on the average, 15 grammes of haemoglobin per 100 ml. so that the quite common loss of ca. 1,250 ml. of blood means a corresponding loss of some 184 grammes of haemoglobin and some 625 milligrammes of iron. Blood is the main "storage" site for iron in the new-born infant and quite possibly in other species. Underwood (1956) puts the position clearly in saying "the major source or 'store' of iron in the human infant is normally contained in the considerable plethora of haemoglobin in the blood at birth. If the blood of the new-born contains 20 to 22 g. haemoglobin per 100 ml., which is usual provided that the tying of the cord is delayed until it has stopped pulsating . . . it can be calculated that some 200 to 220 mg. of iron is present in the blood alone, or 6 to 7 times the amount stored in the liver." It is probable that these remarks are substantially true of the horse and since mares' milk contains only some 0.4 mg. iron per litre (Moore, 1957) it would take a long time to recover the iron loss from milk alone but no doubt the "deficiency" is made good fairly quickly once the foal begins to consume grass regularly since properly sampled pastures contain from 50 to 80 p.p.m. of iron, although never more than 150 p.p.m. (Cuthbertson, 1954).

At present it is not known whether there is an immediate decrease in the total erythrocyte count and haemoglobin content of blood in new-born Thoroughbred foals comparable to what happens in new-born children. Todd *et al.* (1951) did not observe such decreases but their earliest samples were taken at 2 days of age and, moreover, they did not concern themselves with the time or method of cutting the umbilical cord. Our own mean figure of 15 g. Hb per 100 ml. for cord blood is somewhat higher than theirs (12 g. per cent.) for a 1 to 4 week age group and we have the impression that when the foal is allowed to regain its placental blood there is an immediate fall in haemoglobin to a fairly stable level. We intend to obtain more information on these points during the coming season.

We found the total serum proteins in 9 cases to average 3.8 g. per 100 ml. so that a deprivation of 1,250 ml. of placental blood represents an appreciable loss of both albumin and globulins. In addition, of course, there are the many other organic and inorganic constituents which, although perhaps dispensable without clinical illness, would (presumably) be better within the body of the new-born as they almost always come to be following a natural undisturbed birth.

Apart from the loss of specific blood constituents, there is the question of the haemodynamics of the circulation at and immediately following birth. It is not possible at the present time to specify the consequences which blood deprivation may have upon blood volume, cardiac output and blood pressure, particularly in so far as these may in turn influence lung expansion. However, Jäykkä (1957) has shown that "capillary erection" plays an important part in affecting lung expansion in the new-born infant. He also found that liquid pressure, acting through the pulmonary artery, produces in the respiratory part of the lungs a condition which exactly corresponds in its microanatomical features to a normal aerated lung. Air inflation alone was unable to reproduce this normal appearance in stillborn human and lambs' lungs.

Between December, 1956, and August, 1957, there were various important papers and a substantial correspondence in *The Lancet* relating particularly to the new-born infant's oxygen supply, the effects of foetal anoxia, the transfer of blood between baby and placenta in the minutes after birth (Gunther, 1957) and the architectural function of pulmonary capillaries (Bonham Carter, 1957).

Brown (1957) on several occasions emphasised his belief that the new-born should be allowed to regain its placental blood. On May 19th he wrote, *inter alia*, "the important point . . . is the delayed ligation of the umbilical cord. This may allow time for respiration and expansion of the lungs to occur before the babies' hitherto sole supply of oxygen is cut off and harmful effects from acute asphyxia have resulted. It is also possible that the increased volume of blood obtained from the placenta may help to fill the pulmonary capillaries and assist in alveolar expansion, as suggested by Jäykkä's work."

It is clear from the literature that a number of prominent paediatricians are thinking of foetal anoxia, lung expansion, cardiac output and blood pressure, the passage of all the blood from the placenta to the new-born and the early abnormalities of pulmonary syndrome and cerebral irritation (Bound, 1956) as probably all interrelated in some way.

Perhaps it is important to realise that these latter conditions appear to have some striking similarities to the barking foal in which widespread atelectasis has been a consistent pathological feature of our cases. Further, it is of much interest that the human infant and the Thoroughbred foal are the only two species habitually subjected to interference, assistance and early cord cutting at parturition (Mahaffey & Rossdale, 1957).

It is impossible to trace the precise origin of the almost universal practices of exerting traction upon the foal during parturition and of the *extremely* precipitate severance of the Thoroughbred umbilical cord after delivery. It is probably only following caesarean delivery in humans that the cord is ever cut so consistently early as it is after many Thoroughbred births. Neither practice has been a veterinary text-book recommendation in modern times. Fleming (1878) wrote, "In parturition there is as much wisdom shown in remaining a spectator sometimes, as in interfering at other times when circumstances require it. It is only when obstacles insurmountable by the natural efforts of the animal offer themselves that aid must be rendered. So long as the course of parturition remains normal nothing should be done under ordinary circumstances." We assume that the

(*Table I overleaf, main text continued on page* 150)

TABLE I.—DATA COLLECTED DURING 61 THOROUGHBRED PARTURITIONS

Number of mare	Days ±11 months from last service	Breaking water to appearance of limbs	Time for delivery	Limbs to complete expulsions	Help in delivery	Umbilical Cord: Method of severance	Umbilical Cord: Duration of pulsation	Umbilical Cord: Time of severance from delivery	Umbilical Cord: Amount of blood collected	After birth: Weight	After birth: Time expelled p.p.	Foal time to: Standing	Foal time to: Sucking mother	Foal's heart rate at: Birth	Foal's heart rate at: 10 mins. p.p.	Mare stood up at (*Time not recorded after 5 min.)
Mare remained recumbent :—						**Immediate Severance of Cord**										
1	—	—	—	—	Strong pull	Tied/cut	—	Seconds	900 c.c.	—	—	—	—	—	—	10 mins.
2	0	—	30	—	Fairly strong pull	Tied/cut	—	Seconds	1,500 c.c.	—	—	—	—	—	—	—
3	—	5	—	15	—	Tied/cut	—	Seconds	840 c.c.	—	—	1.5 hrs., with help	—	—	168	10 mins.
4	+10	—	—	—	Pull on legs	Tied/cut	—	Seconds	1,050 c.c.	10 lb.	20 mins.	24 mins.	—	—	160	19 mins.
5	−10	—	—	—	Strong pull	Tied/cut	—	Seconds	1,410 c.c.	—	—	120 mins.	6 hrs.	—	—	15 mins.
6	—	—	—	—	Pull	Tied/cut	—	Seconds	1,380 c.c.	—	—	—	—	—	—	* 5 mins.
7	− 5	—	—	—	Pull	Tied/cut	—	Seconds	1,200 c.c.	—	—	—	—	—	—	10 mins.
8	0	—	—	—	Pull	Tied/cut	—	Seconds	900 c.c.	—	—	—	—	—	—	* 5 mins.
9	+ 1	—	—	—	Pull	Tied/cut	—	Seconds	900 c.c.	—	—	—	—	—	—	* 5 mins.
10	−10	—	15	—	Little help	Tied/cut	—	Seconds	480 c.c.	10 lb.	—	—	3 hrs.	—	—	* 5 mins.
11	—	—	—	—	Pull	Tied/cut	—	Seconds	660 c.c.	—	—	—	—	—	—	* 5 mins.
Mare got up immediately :—																
12	+ 7	1	—	14	None	Broken by mare getting up	—	Seconds	Not possible	—	25 mins.	45 mins.	—	52	150	Immediately
13	+ 5	5	—	15	None (easy)	Broken by mare getting up	—	Seconds	Not possible	15 lb.	30 mins.	40 mins.	45 mins.	—	60	Immediately
14	− 5	—	—	—	Strong pull	Broken by mare getting up	—	—	Not possible	—	—	Had to be lifted	6 hrs.	—	136	Immediately
Mare foaled standing :—																
15	+ 2	—	—	—	Position corrected	Broken on way to ground	—	Seconds	600 c.c.	—	—	—	—	—	—	—
16	− 3	—	—	—	—	Broken on way to ground	—	Seconds	Not possible	—	—	—	—	—	—	—
(a) Cord Severed Whilst Pulsating :—						**Delayed Severance**										
Mare Remained Recumbent :—																
17	3	—	15	—	Foot pulled forward	Broken by effect of mare's final effort	—	Seconds	Not possible	—	—	—	—	—	—	* 5 mins.
18	+13	—	50	—	Slight pull	Broken by hand	—	1 min.	480 c.c.	11.5 lb.	30 mins.	20 mins.	4 hrs.	—	—	20 mins.
19	+ 8	—	10	—	None, very easy	Broken by foal's hind leg	—	1 min.	900 c.c.	—	—	—	—	—	—	5 mins.
20	+12	—	30	—	Very little	Broken by hand	—	1 min.	210 c.c.	16 lb.	45 mins.	120 mins.	7 hrs.	—	—	15 mins.
21	− 7	—	15	—	No help, easy	Broken by hand	—	1 min.	580 c.c.	—	—	60 mins.	4 hrs.	—	—	* 5 mins.
22	− 1	—	—	—	None	Broken by hand	—	1 min.	690 c.c.	—	—	20 mins.	—	—	—	20 mins.
23	0	5	—	5	Strong pull	Mare rolled, broke cord	—	1 min.	480 c.c.	14 lb.	75 mins.	45 mins.	—	60	100	* 5 mins.
24	+10	—	2	—	Some help	Mare got up	—	1 min.	Not possible	13.5 lb.	20 mins.	—	—	100–120	128	1 min.
25	0	—	—	—	Easy, no help	Mare got up	—	1 min.	300 c.c.	—	12 hrs.	—	—	—	96	1 min.
26	+10	—	—	—	Strong pull	Mare got up	—	2 mins.	Not possible	—	—	—	—	—	—	2 mins.
27	+ 7	—	15	—	Leg pulled forward	Mare got up	—	2 mins.	Not possible	—	—	—	—	—	—	2 mins.
28	− 4	—	—	—	Left leg pulled forward	Broken by hand	—	2.5 mins.	130 c.c.	16 lb.	15 mins.	—	15 mins. on finger	60	142	15 mins.
29	+12	15	—	20	Strong pull	Tied/cut	—	4 mins.	150 c.c.	11 lb.	30 mins.	55 mins.	—	60	126	20 mins.
30	+ 6	—	—	—	Easy, no help	Tied/cut	—	5 mins.	450 c.c.	14 lb.	30 mins.	30 mins.	—	80	156	20 mins.
31	−11	3	—	17	Pull	Broken by hand	—	5 mins.	200 c.c.	9 lb.	35 mins.	50 mins.	130 mins.	64	120	15 mins.
32	− 7	—	—	—	Easy after leg pulled forward	Broken by hand	—	5 mins.	180 c.c.	18 lb.	—	—	—	—	—	16 mins.

32	− 7	—	—	—	Easy after leg pulled forward	Broken by hand	—	5 mins.	180 c.c.	18 lb.	—	—	—	—	—	16 mins.

(b) Cord Severed After Pulsation had Ceased

Mare Remained Recumbent :—

33	+12	—	—	—	Right leg pulled forward, then pull	Cut	2 mins.	5.5 mins.	210 c.c.	—	—	—	—	64	120	15 mins.
34	− 7	—	30	—	Fairly strong pull	Cut	2 mins.	5.5 mins.	510 c.c.	14 lb.	2 hrs.	35 mins.	10 mins. on finger	80	—	15 mins.
35	—	—	—	—	Leg pulled forward	Cut	1 min.	2 mins.	210 c.c.	13 lb.	20 mins.	30 mins.	45 mins.	80	—	12 mins.
36	0	—	5	—	Strong pull	—	6 mins.	7 mins.	150 c.c.	—	—	—	10 mins. on finger	—	—	7 mins.
37	+ 8	—	20	—	Strong pull	Broken by mare rolling	½ min.	1 min.	Not possible	—	—	—	—	—	—	Not recorded
38	—	—	5	—	Leg pulled forward	Broken by hand	2 mins.	3 mins.	360 c.c.	14.5 lb.	30 mins.	27 mins.	—	—	—	20 mins.
39	− 6	—	No record	—	—	Broken by hand	3 mins.	5 mins.	120 c.c.	—	—	—	—	142	120	*Over 5 mins.
40	− 3	1	—	9	None	Broken by hand	5 mins.	6 mins.	150 c.c.	15 lb.	—	45 mins.	90 mins.	80	—	10 mins.
41	0	—	20	—	None	Broken by hand	2 mins.	3 mins.	240 c.c.	—	—	—	—	—	—	*Over 5 mins.
42	0	12	—	21	—	Cut	1 min.	2 mins.	240 c.c.	—	15 mins.	15 mins.	10 mins. on finger	80	120	15 mins.
43	0	—	15	—	None	Broken by hand	1½ mins.	2.4 mins.	120 c.c.	—	—	—	—	—	—	11 mins.
44	0	—	35	—	Strong pull by 2 men	Mare got up, placenta attached to foal	1 min.	2 mins.	80 c.c.	—	—	3 hrs.	—	—	—	2 mins.
45	+13	4	—	8	One leg pulled forward then pull	Broken by hand	1½ mins.	2 mins.	210 c.c.	—	—	—	—	64	96	13 mins.
46	−14	5	—	15	Good pull	Broken by hand	½ min.	2 mins.	495 c.c.	13 lb.	30 mins.	80 mins.	4 hrs.	48	116	20 mins.
47	+ 2	—	15	—	Fairly strong pull	Cut	½ min.	2 mins.	150 c.c.	13 lb.	—	—	—	—	80	10 mins.
48	+ 2	—	11	—	Very easy, no help	Broken by hand	7 mins.	9 mins.	75 c.c.	16 lb.	20 mins.	—	10 mins. on finger	72	120	20 mins.
49	+ 2	—	10	—	—	Foal pulled to mare's head	½ min.	2.5 mins.	150 c.c.	12 lb.	30 mins.	80 mins.	10 mins.	—	—	11 mins.
50	+ 4	—	—	—	Steady pull	Cut	1 min.	2.5 mins.	35 c.c.	—	—	—	120 mins.	—	—	17 mins.
51	+ 1	—	11	—	—	Cut	2 mins.	5 mins.	30 c.c.	12 lb.	70 mins.	—	—	—	—	*Over 5 mins.
52	+ 3	—	9	—	Strong pull	Tied/cut	1½ mins.	5 mins.	180 c.c.	14 lb.	30 mins.	45 mins.	1 hr.	60	120	10 mins.
53	− 7	—	—	—	Easy, no help	Broken by hand	½ min.	4 mins.	210 c.c.	—	—	—	—	—	—	10 mins.
59	− 4	—	5	—	—	Broken by hand	2 mins.	4 mins.	210 c.c.	17 lb.	25 mins.	—	—	100	—	18 mins.
60	+ 3	—	No record	—	—	Broken by hand	2 mins.	5 mins.	120 c.c.	14 lb.	20 mins.	—	—	89	148	20 mins.
61	− 6	—	15	—	None	Tied/cut	1 min.	2 mins.	270 c.c.	—	2 hrs.	1 hr.	1½ hrs.	—	—	14 mins.

(c) Cord Severed After Complete Placental Separation

Mare remained recumbent :—

54	+ 9	—	17	—	None	Broken by foal	—	18 mins.	10 c.c.	7 lb.	13 mins.	Foal very much below normal size 12 hrs. with help	—	—	—	15 mins.
55	—	—	—	—	—	Cut	—	—	—	—	—	—	—	100	—	—

MISCELLANEOUS

56	—	—	6	—	Pull by 1 man	Cut	—	—	—	—	—	61 mins.	2 hrs.	—	—	15 mins.
57	− 1	—	12	—	—	Cut	—	—	—	—	42 mins.	—	—	82	140	20 mins.
58	−11	—	40	—	Steady pull	Tied/cut	—	—	—	—	—	—	—	—	—	—

practice of assisting at Thoroughbred births grew up in England and that it was transferred to Ireland, France and Italy by migratory grooms. To begin it must have become the common practice to have mares foal indoors under observation. This probably coincided with increasing interest and investment in racing and the increasing values of mares, stallion service fees and foals. Climatic factors were no doubt important, perhaps especially after 1858 when the ages of racehorses were made to date from January 1st of any year. As a consequence it became a natural desire to have mares foal as near as possible to this date, which often meant under rather severe winter conditions.

Quite apart from climatic considerations, the practice of having mares foal indoors has much to recommend it provided the onlooker can resist the temptation to do too much. This is not always easy, for the urge to assist can be very great even when everything is proceeding normally. The efforts of the mare at any moment often seem so great and progress relatively so little that one is constantly tempted to assist. Furthermore, a true sense of time is often lost under such circumstances. The rapidity with which the foal dies if dystocia occurs and parturition is prolonged is well known. Fleming (*loc. cit.*) wrote, "Many veterinarians, and amongst them Saint-Cyr, have been struck by the fact that no matter how soon they were called in to a case of difficult parturition in the mare, nor how trifling the difficulty might be and rapid the delivery, a *living* foal was never produced." One of us had exactly the same experience in a large Thoroughbred practice in Australia where mares usually foaled without supervision. The foal does not seem at all tolerant of anoxia (if, indeed, it is this which leads to its rapid death when delivery is delayed) and in this respect it appears to differ from other domesticated animals, particularly cattle. In England many minor abnormalities of position are corrected rapidly because someone is present throughout the whole process of foaling, delivery then proceeds uneventfully.

It is unlikely that any harm can result from carefully ascertaining that the foal's position offers no obstacle to birth, but when this is so, traction is surely unnecessary and the fact must be urged upon grooms. If they must assist, their efforts should be moderate and cease completely once the thorax is delivered. Largely because it is not possible to state a time at which the transference of blood from the placenta is complete we would prefer that severance of the cord be left entirely to natural processes. We do not believe that the umbilical cord requires any human attention whatsoever provided it is allowed to break at the correct place and time (generally by the movement of the mare). Under normal circumstances there is no risk at all of haemorrhage from the vessels in the navel stump, their retraction occurs in a way which is virtually impossible after cutting and provides an effective seal against both bleeding and (almost certainly) infection. It is difficult to imagine a worse procedure than leaving a substantial "meaty" mass of umbilical cord at the navel as happens so commonly after cutting the cord with scissors. This provides an ideal medium for the passage of micro-organisms whose entrance to the abdominal portions of the umbilical vein and arteries are not hindered in any way by the "sterile" piece of tape so frequently used to "tie off" the stump. Almost as undesirable a procedure is the application of strong antiseptics (notably iodine) destructive as they are to tissues with which they come in contact. Well over 50 per cent. of Thoroughbred foals coming to *post-mortem* examination at the Equine Research Station have appreciable amounts of pus in the distal ends of the closing umbilical arteries.

Although only a small proportion of these ever show clinical symptoms of joint-ill many must be considered potential cases. We suspect that the methods of dealing with the umbilical cord are probably directly related to the incidence of pus in the vestigial vessels and of joint-ill and records are to be kept in future to ascertain the incidence of both conditions with relation to methods of treating the cord. We think there is very little risk of infection *via* the navel provided the cord is allowed to rupture naturally, if, however, any particular environment is suspected of being heavily contaminated, parenteral antibiotics as a prophylactic measure would meet the problem far more efficiently than local treatment which, judging by the incidence of infected vessels (*vide supra*), cannot be very effective, even if not directly harmful.

The New-born Foal

Before the foetus passes into the pelvis a pull on the forelegs often elicits a marked withdrawal response and whilst the mare is still standing the limbs, which are just protruding from the vulva, sometimes move a little. Otherwise the foal makes very little movement during delivery, indeed it is considerably more inert and less reactive to stimuli during this time than it is when still *in utero*, just before parturition commences. Whilst passing through the birth canal the oral mucous membranes are deep purple in colour and reflect a marked degree of anoxia, probably the most severe that the foetus or foal ever has to withstand normally and it may be that the general foetal inertia exhibited at this stage is associated with the anoxia. Within seconds of complete delivery the colour of the buccal mucosa is transformed to a bright pink colour.

Whilst the amnion is intact there is generally no recognisable respiratory activity until the thorax is free, except for a little movement of the nares sufficient to cause the amnion to be drawn slightly into the nostrils. Then a series of gasps occur, the neck is arched and the mouth is opened. If the amnion is ruptured prematurely the gasps are noticeable before the thorax passes the vulva. Once this is accomplished, the mare makes her final effort and within a few seconds the hips of the foal flop out from the vagina. Although the thorax and abdomen of the new-born are sometimes projected well away from the mare, in our experience the cord is never broken by this explosive effort unless a pull is being exerted simultaneously on the foal's forelegs.

The new-born lies on its side momentarily with the hind legs up to the level of the hocks, still in the

vagina. Contact with the ground evokes an immediate response: the eyes open and postural reflexes come into action at once. The head, which before was limp and could be manipulated without resistance, is raised voluntarily. At the same time muscular tone appears in the forelimbs and back, and the foal raises itself onto the sternum, the forelegs stretched out in front of it. It is this immediate and quite vigorous reaction by the foal which causes the natural rupture of the amnion. Rapid respiratory movements then develop. At first they are abdominal in type and the costal arch appears raised and more or less fixed in position. Sometimes the lack of thoracic movements (for up to 30 seconds) cause the groom to become somewhat perturbed because he thinks the foal is not breathing at all but the thoracic respiration is soon established; to begin with it is rapid (ca. 150 per minute) and rather arrhythmic, but even by the end of the first minute a steadier rate and rhythm (ca. 80 p.m.) are established which do not alter very much unless the animal is disturbed by man or unless, for some other reason, it becomes very active.

If there is no interference, the foal remains resting on its sternum, the hind legs still in the vagina and the forelegs stretched out in front of it. The cord remains intact and for a little time the new-born has two organs of respiration, the lungs, which are rapidly gaining in efficiency, and the placenta, which is still functioning but with quickly decreasing efficiency.

With the establishment of pulmonary ventilation there is increasingly efficient oxygenation and a decreasing degree of anoxia, a series of inborn reflexes are released and a characteristic behaviour pattern soon develops. The period during which the undisturbed foal lies quietly is of variable duration. In the great majority of cases it is certainly until well after pulsation in the cord has ceased. The hind legs are withdrawn from the vagina in stages, partly by the flexing movements associated with the foal's efforts to right itself posturally; between these efforts it tends to rest on its side.

At this time the new-born is very sensitive to outside stimuli, especially to the handling of its head. We have heard some whinny almost immediately after birth. The sucking reflex is apparent in most at about 10 minutes after delivery when normal foals suck a finger placed in the mouth. This is often done very vigorously. About the same time the foal responds to moving objects close to its eyes.

Auscultation of the Chest

If the stethoscope is applied to the chest wall as soon as it appears outside the vagina, little can be heard but when thoracic respiration commences soft sounds are audible over the entire lung area. These quickly become harsher in quality and of much greater intensity. Vibratory sounds can often be heard, these may originate in the nasal passages or the soft palate and be transmitted down the trachea and bronchial tree. Sibilant sounds can be heard in some cases and "rattling" fluid sounds in others.

From the beginning the two heart sounds characteristic of the adult are audible. In most cases a murmur over the position of the ductus arteriosus can be heard in an hour or so (but seldom earlier) after delivery. It is identical in rate with that of the heart but it appears to be independent of the other two sounds. The intensity seems to rise and fall during a cardiac cycle. This sound is probably similar in origin to that heard in the experimental lamb by Dawes *et al.* (1955) where it was found to be associated with a constricting ductus arteriosus.

The average heart rate at birth in 20 cases was 75 per minute (range 48 to 142). Ten minutes later it was almost invariably higher; the average rate in 22 cases was then 124 per minute (range 80 to 168). The rapid rates at this time were generally associated with the increasing activity of the foal.

The time elapsing between delivery and the ability of the foal to stand unaided in our series was quite variable. We were not able to arrange a satisfactory experiment designed to show what effects, if any, blood deprivation *per se* might have upon this. Almost all the foals were subjected to traction during delivery and many were "hustled" or interfered with in various ways immediately after birth. Some had the navel stump dressed, others were rubbed with straw in an attempt to dry them.

Irrespective of the time at which the cord was severed, 24 foals took an average time of 73 minutes to stand unaided. In 6 cases where the cord was ruptured immediately upon delivery the foals took an average of 113 minutes to stand (range 24 to 360 minutes). In two groups of 9 mares there was no appreciable difference in the time for the foal to stand when the cord was severed after the lapse of one minute, but whilst it was still pulsating, and the group in which severance did not occur until pulsation had ceased. The average times were 46 and 59 minutes respectively.

We were also unable to arrange a satisfactory experiment enabling us to assess how the time taken between delivery and the foal first sucking the mare might vary in accordance with a specific stud practice, particularly with relation to blood deprivation. We had to be content with impressions for the time being. Five foals from the group in which severance was delayed until pulsation had ceased were sucking after an average time of 109 minutes whereas 8 subjected to cord severance before pulsation had ceased were not sucking for an average time of 247 minutes. However, there was considerable overlapping between these two groups as there was amongst those compared for the time taken to stand unaided. In many instances, too, the groom guided the foal to the udder and attempted to make it start sucking while the mare was held.

It seems that the Thoroughbred foal, at least under some modern stud conditions, is appreciably slower than other breeds to stand, walk and suck the mother. There is no doubt that normal new-born experimental Welsh ponies kept at the Equine Research Station, Newmarket, are on their feet and walk and run within half an hour or so of birth. This is considerably sooner than most of the Thoroughbreds we have seen at Newmarket. One of us also has a firm impression that delays of up to several hours in

(*Concluded at foot of col.* 1 *overleaf*)

Professor N. J. Scorgie

WE record, with deep regret, the death of Professor Norman James Scorgie, M.A., B.SC., M.R.C.V.S., Courtauld Professor of Animal Husbandry and Veterinary Hygiene at the Royal Veterinary College, which took place suddenly in Iran in the early hours of Monday, February 10th. He had accepted an invitation from the Food and Agriculture Organisation to give advice on re-organising the Animal Husbandry Department of the Veterinary Faculty of Tehran University. This was his second visit to Tehran.

Professor Scorgie was born in 1908. He was educated at Oldmeldrum Secondary School and at Inverurie Academy, Aberdeenshire, thereafter proceeding to the University of Aberdeen from which he graduated Master of Arts and Bachelor of Science. He then attended the Royal Veterinary College, London, where he qualified in 1934.

While at Aberdeen he acted as a junior demonstrator in the Natural History Department (1928 until 1930), and concurrently served as a personal assistant to the late Sir J. Arthur Thompson, then Professor of Natural History in the University.

In his final year at the Royal Veterinary College he obtained the following distinctions: First and Silver Medal in the R.V.C. Centenary Prize for final year students, 1933-4; First and Silver Medal in the Coleman Prize Award, 1933-4; First and Governors' Silver Medal in Surgery, 1933-4; Second and Governors' Bronze Medal in Medicine, 1933-4; Bronze Medal Award of the Royal Agricultural Society of England for special examination in connexion with the pathology of the diseases of domestic animals.

After a period in general practice at Woodstock, Oxon., and in Aberdeenshire, Scorgie joined the staff of the Research Institute in Animal Pathology at the Royal Veterinary College, shortly transferring to the newly formed Division of Preventive Medicine, in which he worked for about 2½ years. There he carried out research work in connexion with the bacteriology, treatment, and field control of bovine mastitis and of contagious abortion of cattle. He also undertook studies in the diagnosis and epidemiology of trichomoniasis of cattle, and in 1937, in collaboration with others, published the first detailed report of the occurrence of this disease in Great Britain.

In 1936 he was awarded the Bayer Travelling Fellowship by the College and visited certain institutions and poultry stations for the purpose of obtaining first-hand experience in poultry management and disease control.

In 1937 Scorgie was transferred at his own request from the Division of Preventive Medicine to the Department of Animal Husbandry, Veterinary Hygiene and Dietetics, in which he was first appointed as Lecturer, later being raised to the status of Reader.

In November, 1946, he was appointed to the Courtauld Chair of Animal Husbandry, Veterinary Hygiene and Dietetics. Following the admission of the College as a School of the University of London, the Senate conferred upon him in 1951 the title of Professor of Veterinary Hygiene in the University of London.

Professor Scorgie leaves a wife and two daughters, to whom our most sincere condolences are extended.

Parturition in the Thoroughbred, etc.—*Concluded.*

walking are commoner amongst Newmarket-born Thoroughbred foals than amongst Thoroughbreds born without human assistance in Australia.

Acknowledgments.—We should like to express our thanks and gratitude to M. le docteur Edouard Pouret, vétérinaire, Argentan, France, for his exceptional kindness and great hospitality in having one of us (L. W. M.) to stay with him for a period to study common practices during the foaling season in Normandy. Dr. G. Bassignana, at Milan, was most helpful during a short stay in his country.

We were afforded invaluable co-operation by various stud grooms in the Newmarket area.

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HEREFORDS FOR ISRAEL

Dr. Y. Goor, head of the Israeli veterinary field service, has just purchased in Britain 35 Hereford bulls which he selected especially for certain characteristics which enable the animals to withstand trouble caused by the sand and the heat of subtropical areas. It is intended to cross the Hereford strain with native cattle and also with a breed imported from Yugoslavia. Herefords are, apparently, popular in Israel, about 200 having been imported there a few years ago.

News and Comment

A SUGGESTED REPRINT SERVICE

It has been suggested that a number of members of the profession, particularly those engaged in teaching or research work, would find it useful to receive monthly reprints of the summaries which appear at the beginning of clinical and scientific papers. Such summaries, reproduced in a form for easy filing and having a blank space below the printed matter for the worker's own notes, could be provided at a cost of approximately two guineas per year. It would not be practicable from a clerical point of view to supply individual summaries on odd occasions.

In order that the Editorial Committee may be guided as to whether there would be a sufficient demand for this service readers are asked to be good enough to communicate with the Editor saying whether they would subscribe to such a service if it were started. *May we urge readers to give their attention to this matter as it will not be possible to proceed further until their wishes are known?*

ANIMAL HEALTH TRUST FILM PREMIERE

The Duchess of Kent, with the Duke of Kent and Princess Alexandra, attended the première in London on February 6th of the Rank Organisation's new Charles Dickens film "A Tale of Two Cities" which was given in aid of the funds of The Animal Health Trust.

On arrival at the theatre, the Royal party was received by the Duke of Norfolk, President of the Trust, with Lord Rank, Chairman of the Executive Committee, and Dr. W. R. Wooldridge, founder and Scientific Director. Among those presented to Her Royal Highness were Lady Rank, Mrs. Wooldridge, Sir Stamford and Lady Cooper, Mr. Wm. C. Miller, Director of the Trust's Equine Research Station, and Mrs. Miller.

Many other of the Trust's scientific and administrative personnel were in the audience, which also included two of the great author's grandsons and the Mayors of the three Kentish towns—Rochester, Chatham, and Gillingham—around which much of the plot of the story revolves.

It is understood that the proceeds of the première will exceed those of any similar event in the past.

BURNS SUPPER AT LASSWADE

The annual Burns Supper held at the Ministry of Agriculture, Veterinary Laboratory, Lasswade, on Tuesday, January 28th, was attended by 73 members of the staff and guests. After the haggis had been "piped in" in traditional manner by Pipe Major Crombie and addressed by Mr. J. E. Wilson, the Immortal Memory was proposed by Mr. J. N. Ritchie, the Chief Veterinary Officer, and "The Lassies" by Captain N. Bisset. Among the guests were Dr. A. W. Stableforth, Professor A. Robertson, Dr. A. W. Greenwood, Dr. R. S. Gowe (Ottawa, Canada), Dr. J. Russell Greig, Dr. J. Stamp, Dr. A. Watt, Messrs. R. Chalmers Watson, D. W. Deas, R. Hood, J. Beale, R. Paisley, J. A. Anderson, R. J. Scott of Melville & Hunter, and representatives of the Ministry of Works and other government offices.

R.C.V.S. HOUSE OF COMMONS RECEPTION

The President, Mr. G. N. Gould, with the College officers—Mr. Sumner and Professors Pugh and Bosworth—held a small cocktail party in the House of Commons on Thursday evening of this week in honour of Sir James Duncan, Bt., M.P., on his ceasing to be a member of the College Council appointed by the Privy Council.

The opportunity was also taken to welcome the new Minister of Agriculture, Mr. John Hare, M.P., and to say farewell to his predecessor, The Chancellor of the Exchequer, Mr. Heathcoat-Amory, M.P.

Other members of Parliament who accepted invitations were Mr. Tom Williams, Mr. Champion, Mr. Collick, Mr. Peart, and Commander Maitland, the three latter being past and present members of the College Council appointed by the Privy Council, whose clerk, Mr. Agnew, was also present together with Sir Laurence Watkinson, appointed a Privy Council member of the College Council last year.

In addition to the Permanent and Deputy Secretaries of the Ministry of Agriculture, Sir Alan Hitchman and Sir Richard Manktelow, there was a newcomer to College circles in Mr. J. Hensley, who has recently become Under Secretary with responsibility for veterinary affairs in place of Mr. Tame who was also present. The Animal Health Division was represented by the Assistant Secretary, Mr. Quick, whilst the chief Veterinary Officer, Mr. Ritchie, was present in a dual capacity being also Chairman of the College's Finance and General Purposes Committee.

Other College Chairmen present were Professor Lamont (Education), Professor Weipers (Parliamentary), and Mr. Guy Anderson (Preliminary Investigation and Advisory).

The President of the B.V.A., and Sir James Henderson-Stewart, Bt., M.P., were both unavoidably prevented from being present.

IN PARLIAMENT

Condemned Meat

MR. HAYMAN (February 7th) asked the Minister of Agriculture, Fisheries and Food what quantity of meat passing through slaughterhouses was condemned as unfit for human consumption in the last year for which figures are available.

MR. GODBER: Since decontrol in 1954, no precise statistics have been available. The quantity in the financial year 1953-4 was 7,279 tons, excluding condemnations at bacon factories of which there are no statistics.

Animals (Laboratory Experiments)

MRS. L. JEGER (February 6th) asked the Secretary of State for the Home Department how many veterinary surgeons are employed by his Department in connexion with the enforcement of regulations concerning animals used for laboratory experiments.

XUM

MR. RENTON: None, Sir.

MRS. JEGER: Can the Minister tell us who is responsible for carrying out these regulations concerning the protection of animals? How can he be satisfied that adequate protection is being given if not a single veterinary surgeon is employed by the Home Office?

MR. RENTON: As I understand it, the duties of the inspectors whom we employ are not confined to watching over the welfare of experimental animals. It is also their duty to advise on applications for licences and certificates within the limits set by the Cruelty to Animals Act, 1876. We have an advisory committee and since 1952 a veterinarian has been a member of it.

THE ROCKEFELLER GRANTS

Among the grants recently announced by the Rockefeller Foundation are the following: $4,500 (£1,600) for equipment for research in insect physiology in the sub-department of entomology, University of Cambridge, and $10,000 (£3,570) for laboratory equipment for research in dairying, Shinfield (University of Reading).

FIFTY YEARS AGO

Last week we quoted from a leading article by William Hunting in which he severely took to task Mr. J. A. W. Dollar for circulating the profession. That gentleman reacted with spirit, as may be gathered from the following short extract from a letter published over his signature on February 15th:—

"My reputation, such as it is, is founded on twenty years of work for what I believe to be professional liberty and justice, and has stood much harder trials than your intemperate outbursts are ever likely to subject it to.

"I am accused of ignorance of the Bill and of what has been taking place. For a year past I have done myself the pleasure of *not* reading THE RECORD, so I was unaware that 'We have explained and approved the principle of the annual registration scheme so often that it seems superfluous to dwell on Mr. Dollar's absurd ideas,' and to that extent I must plead guilty. But I *have* been at some pains to read the Bill (though without the advantage, Sir, of your illuminating instruction), and I have discovered various points in it which seem, if I may say so without offence, to have escaped even your penetrating intelligence. It is unfortunate for me, under these circumstances, that I ventured to place my discoveries before the profession without first assuring myself that my action would meet with your distinguished approval. But it is, perhaps, even more unfortunate for you, Sir, to find, after issuing your fiat to the profession to put my postcard in the fire, that considerably over a thousand of these misguided persons have sent their postcards to me, and that ninety per cent. of them agree with my views. You see they had not waited for your orders. And more have come since you issued your orders. But it would be a little strong, even for the Editor of THE RECORD, to suggest that these Members of the R.C.V.S. are all fools. And after what you have said one side or the other must surely be in that position.

"You see I still have a rag or two of political reputation left."

CLINICAL PROBLEMS IN EVERYDAY PRACTICE

The meeting of the Central Veterinary Society to be held on March 6th, 1958, is following the same pattern as the successful meeting held last year—an endeavour to tap the knowledge that never reaches print. Every veterinary surgeon in practice has his or her pet theory or problem, surgical procedure or technique, line of treatment, diagnostic method, design of instruments, etc., and the "Central" hopes once again to be able to persuade veterinary surgeons in practice to attend this meeting, both to contribute and to learn.

A list of subjects, on which Fellows of the Society have from time to time sought advice, is available from the Honorary Secretary, though contributions can be on any subject of clinical interest. Notification of subject and intention to contribute (not confined to Fellows) should be sent to the secretary, Bruce V. Jones, Allen and Hanburys Limited, Bethnal Green, E.2, *by the end of February*.

MR. PETER HUBERT JAMES

Professor McCunn writes:—

Peter James died in France on January 6th, 1958. The news of his death came as a great shock to me and I am sure it must have caused a similar reaction on those who were his contemporaries at Camden Town. He was only 30 years of age. He qualified M.R.C.V.S. in July, 1955. His academic record was not a brilliant one, for in spite of the utmost hard work and concentration he was one of those who did not show their best in examinations. Be this as it may, he had the qualities of diligence and keenness, and he was blessed with the enquiring type of mind that is the best foundation for a research worker. James did not accept as gospel all he was told, and always wanted to know the reason why. This approach does not always tend to the best of relations between some students and some teachers!

In spite of this, some of us recognised that he was a man who would go far, for he had the attributes of one who would be a student and a searcher after truth all his life. After graduation he decided to make his home in France for his wife was of that country, and she practised there as a dental surgeon. He hoped to practise as a veterinary surgeon in France, and to achieve this object he attended the veterinary school at Alfort in order to obtain a degree. He obtained the "Certificate of End of Studies," and presented his thesis successfully for the veterinary doctorate at Alfort. He came to see me at this time and told me that he was

attracted to a career in pathology and bacteriology. I told him that as the " Mecca " of these things was in Paris, *i.e.* at the Pasteur Institute, he should enquire if he could enter there with a view to attending a course and obtaining a diploma. He took three courses, *i.e.* on bacteriology, serology, and immunology. He obtained the diploma in each subject, with honours in the last. Whilst at the Institute he developed a " special stain " which bears his name.

All this spurred him on to follow a career in research, and as he was interested in the study of cancer he went to the Cancer Institute in Paris and asked if there was any opportunity for a veterinary surgeon to be employed in cancer research. Just before last Christmas his services were not only accepted but he was given the choice of two posts to be taken up after Easter. Dr. Philipe Vigier, under whom he would have worked, said of him that he was just the type of young scientist for which the Institute had been looking.

I can hardly believe, even now, that this young man, on the threshold of a great career, so active, so intent, so full of the spirit of life, who came to see me in November full of life and enthusiasm, has passed on. His friends will remember his penchant for wearing the kilt, his enthusiasm for country dancing, and the keen eyes behind the spectacles when he posed some profound question which nine times out of ten we could not answer. He could shake the most erudite, and make them go secretly to the book.

Peter James achieved much in his short life and under his own steam. Such men are rare and the world can ill afford to lose them. We who knew him extend to his wife, his baby daughter, and his parents our deepest sympathy.

THE " DICK " HORSE SOCIETY

On January 17th the Horse Society of the Royal (Dick) School of Veterinary Studies was addressed by Colonel Frank Weldon on Horse Trials. Colonel Weldon, who captained the British equestrian team at the 1956 Olympic Games in Stockholm, gave a most entertaining talk on his experiences and passed on much useful advice. He completed his address by showing and commenting on films taken during the training of the Olympic team and of the actual event at Stockholm.

The meeting, which was attended by a number of visitors, was concluded after Colonel Weldon had answered questions from the audience.

PERSONAL

Births

ORMISTON.—On January 30th, 1958, at Eastbourne, to Helen, wife of T. T. Ormiston, M.S.R.C.V.S., a daughter, Elizabeth, sister for Andrew and Peter.

SEAMER.—On February 4th, 1958, to Shirley, wife of John Seamer, M.A., B.SC., M.R.C.V.S., D.V.S.M., of Cambridge, a son, John William.

Marriage

MARTIN—GLASS.—On February 1st, 1958, at the Parish Church in Laurencekirk, by the Rev. A. MacLean, James Alexander Martin, B.V.M.S., elder son of Mr. and Mrs. J. Martin, to Evelyn Milne, daughter of Mr. Glass and the late Mrs. E. Glass.

COMING EVENTS

February

18th (Tues.). 89th Annual General Meeting of the Eastern Counties Veterinary Society at the Bell Hotel, Norwich, 10 a.m.

19th (Wed.). Meeting of the Section of Comparative Medicine, Royal Society of Medicine, at the Society's House, 5 p.m.

Meeting of the Warwickshire Veterinary Club at the Regent Hotel, Leamington Spa, 8 p.m.

20th (Thurs.). Ordinary Meeting of the Ayrshire Veterinary Association in the Ailsa Lounge, Ayr Station Hotel, 2.30 p.m.

Annual General Meeting of the South Eastern Veterinary Association at the Royal Star Hotel, Maidstone, 2.30 p.m.

General Meeting of the Herts and Beds Veterinary Association at 70, Holywell Hill, St. Albans, 7.30 p.m.

21st (Fri.). Annual Ball of the Liverpool University Veterinary Society in the Students' Union, 8 p.m.

26th (Wed.) Ordinary General Meeting of the Southern Counties Veterinary Society at the Polygon Hotel, Southampton, 7 p.m.

Meeting of the A.V.T. & R.W.'s Scottish Regional Group in the Moredun Institute, Gilmerton, Edinburgh, 9, 2 p.m.

Ordinary General Meeting of the Sussex Veterinary Society at the Old Ship Hotel, Brighton, 2.30 p.m.

27th (Thurs.). Meeting of the Essex Veterinary Society at the Essex Institute of Agriculture, Writtle, Essex, 7.30 p.m.

28th (Fri.). Dinner-Dance of the South Eastern Veterinary Association in the Queen's Hall, Royal Star Hotel, Maidstone, 8 p.m.

Annual General Meeting of the Royal Counties Veterinary Association at the Grosvenor Hotel, Kidmore Road, Caversham, Reading, 2.15 p.m.

Annual General Meeting of the North of Ireland Veterinary Association at the Wellington Park Hotel, 21, Malone Road, Belfast, 7.15 p.m.

March

5th (Wed.). Annual General Meeting of the A.V.T. & R.W.'s (Northern Region) at the Veterinary Hospital, University of Liverpool, 2 p.m.

6th (Thurs.). General Meeting of the Central Veterinary Society at the Royal Veterinary College, Camden Town, N.W.1, 6 p.m.

96th Annual General Meeting of the Lancashire Veterinary Association at the Blossoms Hotel, Chester, 2.30 p.m.

19th, 20th and 21st (Wed., Thurs. and Fri.). Committee and Council Meetings of the Royal College of Veterinary Surgeons.

April

9th, 10th and 11th (Wed., Thurs. and Fri.). B.V.A. Committee and Council Meetings at the Royal (Dick) School of Veterinary Studies, Edinburgh.

FOOT-AND-MOUTH DISEASE

The areas described in the schedule below are declared to be Infected Areas for the purpose of preventing the spread of foot-and-mouth disease:—

IN THE COUNTY OF DORSET

The Borough of Shaftesbury.

In the Petty Sessional Division of Shaftesbury: The parishes of Cann, Margaret Marsh, Melbury Abbas, Compton Abbas, Fontmell Magna, Bourton, Silton, Gillingham, Buckhorn Weston, Kington Magna, West Stour, East Stour, Stour Provost, Todber and Motcombe.

In the Petty Sessional Division of Sherborne: The parishes of Clifton Maybank, Bradford Abbas, Over Compton, Nether Compton, Trent, Sandford Orcas, Castleton, Poyntington, Oborne, Sherborne, Goathill, Purse Caundle, Haydon, Caundle Marsh, North Wootton and Thornford.

In the Petty Sessional Division of Sturminster: The parishes of Stourton Caundle, Stalbridge, Marnhull and Fifehead Magdalen.

In the Petty Sessional Division of Wimborne: The parishes of Wimborne Minster, Hampreston, West Parley, West Moors, Holt, Colehill, Hinton Parva, Hinton Martell, Verwood and Alderholt and so much of the parishes of Horton and Woodlands as lies to the south and east of the road running from Chalbury *via* Horton and Woodlands to Edmondsham, excluding the said road.

IN THE COUNTY OF SOUTHAMPTON (HAMPSHIRE)

The Boroughs of Christchurch, Lymington and Romsey.

The Petty Sessional Divisions of Lymington, Hythe, Christchurch and Totton and New Forest.

In the Petty Sessional Division of Romsey: The parishes of Wellow, Melchet Park and Plaitford and Sherfield English and so much of the parishes of Romsey Extra and Nursling and Rownhams as lies to the south and west of the main road running from Stockbridge *via* Romsey and Maybush to Southampton, including the said road.

In the Petty Sessional Division of Ringwood and Fordingbridge: The parishes of St. Leonards and St. Ives, Ringwood, Burley, Ellingham, Harbridge and Ibsley, Fordingbridge, Woodgreen, Hale, Breamore, Whitsbury and Rockbourne and so much of the parish of Damerham as lies to the south and east of the road running from Cranborne, *via* Damerham to Rockbourne, excluding the said road.

IN THE COUNTY OF SOMERSET

The Borough of Yeovil.

In the Petty Sessional Division of Yeovil: The parishes of Barwick, Yeovil Without, Brympton, Chilthorne Domer, Tintinhull, Sock Dennis, Ilchester, Yeovilton, West Camel, Queen Camel, Marston Magna, Rimpton, Mudford, Chiltern Cantello and Limington.

In the Petty Sessional Division of Wincanton: The parishes of Lovington, Alford, Castle Cary, Ansford, Bruton, Stoke Trister, Shepton Montague, Charlton Musgrove, Penselwood, Cucklington, Wincanton, Horsington, Abbas and Templecombe, Henstridge, Milborne Port, Corton Denham, South Cadbury, Sparkford, South Barrow, North Barrow, North Cadbury, Pitcombe Bratton, Seymour, Yarlington, Compton Pauncefoot, Charlton Horethorne, North Cheriton, Holton and Maperton.

In the Petty Sessional Division of Somerton: The parishes of Somerton, Compton Dundon, Kingweston, Barton St. David, Lydford, Keinton Mandeville, Babcary, Charlton Mackerell and Kingsdon.

In the Petty Sessional Division of Wells City and County: The parishes of West Pennard, Baltonsborough and Butleigh.

In the Petty Sessional Division of Shepton Mallet: The parishes of West Bradley, East Pennard, Pilton, Croscombe, Shepton Mallet, Ashwick, Pylle, Evercreech, Batcombe, Milton Clevedon, Lamyat and Ditcheat, and so much of the parish of Doulting as lies to the south of the railway line running from Shepton Mallet to West Cranmore, excluding the said railway.

IN THE COUNTY OF WILTS

The City of Salisbury.

In the Petty Sessional Division of Salisbury and Amesbury: The parishes of Redlynch, Landford, Whiteparish, Downton, Odstock, Coombe Bissett, Britford, Clarendon Park, Alderbury, Grimstead, West Dean, Pitton and Farley, Winterbourne, Durnford, Quidhampton, Netherhampton and Laverstock and Ford.

ADDRESSES OF DISEASE INFECTED PREMISES

The list given below indicates, first the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak

Anthrax

Denbigh. Langwern Hall, Llangollen (Feb. 7).

Staffs. Moat Spring Farm, Marchington Woodlands, Uttoxeter (Feb. 3).

Fowl Pest

Ches. Little Heath Farm, Dunham Massey, Altrincham (Feb. 4).

Essex. Stockdale, Stock, Ingatestone (Feb. 7).

Hants. Osborne House, West Wellow, Romsey (Feb. 4); Canada Stores, Canada Road, West Wellow, Romsey; Pear Tree Cottage, Canada Road, West Wellow, Romsey; Vine Cottage, Canada Road, West Wellow, Romsey (Feb. 6).

Lancs. Plumtree Farm, Thistleton, Preston (Feb. 3); Slate Farm, Mawdesley, Ormskirk (Feb. 4); Sedbrook Lane Farm, Mawdesley, Ormskirk (Feb. 6); Brookfields, Station Road, Bamber Bridge, Woodside Farm, Inskip, Preston (Feb. 7); Pompion Brow, Bretherton, Preston (Feb. 8).

Norfolk. Swanton Road Farm, East Dereham (Feb. 4).

Yorks. Dromonby Grange Farm, Kirby-in-Cleveland, Middlesbrough (Feb. 5); Thornfield Road, Dishforth, Thirsk (Feb. 7).

Swine Fever

Beds. Little Bramingham Farm, Streatley, Luton (Feb. 3); North Limbersey Farm, Maulden (Feb. 4); 29, Fields Road, Wootton (Feb. 5); Mill Lane Piggeries, Bartin-in-the-Clay (Feb. 7).

Birmingham. New House Farm, Lea End Lane, Alvechurch (Feb. 5).

Derbys. The Piggeries, Derby Road, Spondon (Feb. 3).

Hunts. Grafham Road, Ellington, Huntingdon (Feb. 3).

Norfolk. Sunnyside Farm, Rickinghall, Diss; Fields O/S 853 and 854, Corkway Drove, Feltwell, Thetford (Feb. 3).

Northants. 194, Bedford Road, Rushden; 252, Newton Road, Rushden (Feb. 6).

Somerset. Bathway House, 146, London Road West, Batheaston, Bath (Feb. 4).

Suffolk. Rendham Hall, Rendham, Saxmundham; The Grange, Wetheringsett, Stowmarket; Lodge Farm, Finningham, Stowmarket (Feb. 3).

Sussex. 10b, Smallholdings, Victoria Drive, Eastbourne (Feb. 5).

Staffs. Homer Hill House, Homer Hill, Cradley, Cradley Heath (Feb. 3).

Worcs. Brine Pits Farm, Wychbold, New Droitwich (Feb. 4).

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

Toxocara canis Infection in the Pig

Sir,—In his Benjamin Ward Richardson Lecture, a summary of which was given in your issue of January 25th, Mr. Horace Thornton suggests a number of problems encountered in meat inspection which deserve the attention of the research worker. One of these questions is the rôle of the larvae of *Ascaris lumbricoides* as a possible cause of haemorrhages in the kidneys of pigs. We have been studying the effects of migrating ascarid larvae on the tissues of the pig and have observed granulomatous lesions in the kidneys following the introduction of larvae (of an appropriate stage of development) into the left heart, but it seems unlikely that this species often finds its way into the systemic circulation following natural infestation. On the other hand we have shown that oral infection with the eggs of *Toxocara canis*, which migrates by the somatic route (Sprent, 1952), can result in haemorrhages in the kidneys and lungs and also cause lesions in other organs including the brain. It is possible, therefore, that a proportion of the haemorrhages seen in the kidneys of slaughtered pigs are caused by infection with *T. canis*. A full report of our studies on the migration of ascarid larvae in the pig is in preparation and will be published in due course.

Yours faithfully,
T. E. GIBSON,
J. T. DONE,
M. D. RICHARDSON.

Central Veterinary Laboratory,
New Haw,
Weybridge,
Surrey.
February 7th, 1958.

Reference

SPRENT, J. F. A. (1952). *J. Inf. Dis.* **90**. 165.

Vibriosis in Bulls

Sir,—Two recent articles in THE VETERINARY RECORD have dealt with the subject of vibriosis in bulls.

In the first article (*Vet. Rec.* **69**, 1,429), 20 out of 26 bulls at an A.I. centre were found to produce vibrio organisms, including 13 infected with pathogenic strains. Would the authors of this paper be good enough to provide additional information on their findings:—

1. The C.R.s of the 13 positive bulls at (a) the time of diagnosis and (b) after treatment.
2. The same facts for the bulls diagnosed as producing non-pathogenic vibrios.
3. Similar facts for the remaining bulls presumably free from vibrios of either type.
4. The difference in herd C.R.s between those using A.I. only (including semen from the 13 positive bulls) and those using A.I. and natural service in the same herd.
5. The incidence of abortion resulting from insemination carried out with semen from infected bulls, produced before treatment.
6. Did the return interval of repeat cows and heifers served with infected semen vary statistically from the return interval when cows were served with semen from clean bulls?

One appreciates the work that has been done on the bacteriological side of vibrio diagnosis in the male, but one feels that this can only be of value to the A.I. movement when findings are related to fertility levels in the female population.

Yours faithfully,
G. F. SMITH,
Chief Veterinary Officer.

Milk Marketing Board,
Thames Ditton,
Surrey.
February 7th, 1958.

The "Space Dog"

Sir,—Regarding the Sputnik dog, Mr. M. J. Henigan admitted in your issue of February 8th that he "did not enjoy the thought of what the unfortunate animal went through in pain and anxiety." Veterinary surgeons are qualified to appraise the conditions to which the dog was subjected, and having done so Mr. Henigan justly concluded that the conditions caused pain and anxiety. Furthermore, to his quantitative, he added his qualitative or moral judgment that the "poor animal suffered, and most horribly so." I cannot reconcile Mr. Henigan's judgments with his ironical comments on those of Major Hamilton Kirk and other veterinary surgeons, who have condemned the Russian action because it inflicted suffering, which, since it was predictable, measurable, and inevitable, constituted deliberate cruelty.

In pleading justification of such cruelty on the grounds that it was designed to furnish information by which mankind "continues to progress," Mr. Henigan made two mistakes. He travestied the fact that in Great Britain discovered cruelty, whatever its purpose and by whomsoever done, is actionable and, if proved, punishable. Secondly, his notion of mankind continuing to progress is of Rousseau's poisonous vintage, which is prescribed by rationalists and embittered revolutionaries. Progress in what, and whence, and whither? If Mr. Henigan confines progress to man's material or temporal betterment I can understand him. If he, like Rousseau, confuses material with moral betterment, I disagree.

Man is a mixture of good and bad, of God and the devil. Which he will express at any given moment is as unpredictable as ever it has been. As in the past so in the present, the saint, the mystic, the disinterested artist, poet, or scientist, the wise, the good, and the beautiful have been vastly outnumbered by those who enjoy the devil's pretence of being dead. Consider some of the devil's current signature tunes: "It pays to advertise"; "Go on and get on"; "I couldn't care less"; "Pay as you earn and buy as you don't"; "'Urry up there, don't keep the bus waiting"; "You've had it." Barbarians used to migrate to England; now we breed them in plenty and they still want Barabbas. Contemporary behaviour induces a very much chastened hopefulness of man's moral betterment.

In our Lord's Gospel I find no grounds for belief in man's capacity to design his moral betterment. If Mr. Henigan is again tempted to think so, I would bid him ponder the question: "When the Son of Man cometh, shall he find faith on the earth?" Such devastating candour in a leader has never been known before or since. All our Lord promised us in this life was the privilege of bearing the cross after Him; the privilege of championing His cause whatever the consequences to ourselves. It is His promise which nerves us veterinary surgeons in our better moments to stand four square with Major Hamilton Kirk and our colleagues in passing moral judgments upon those who perpetrate cruelty on man and animals.

Yours faithfully,
TOM HARE.

529a, Finchley Road,
London, N.W.3.
February 10th, 1958.

"Printers' Pie"

Sir,—I was much amused by your "Printer's Pie" item in the issue of December 21st, and am prompted to mention an article appearing in a local newspaper here following on an incident where a woman had been bitten by a squirrel suspected of rabies. It read: ". . . Pet owners are urged to take their pests to a veterinarian for vaccination . . . ."

Sometimes, how true!

Yours faithfully,
P. L. BUILDER.

1869, Kenwood Street,
Prince George,
British Columbia,
Canada.
January 18th, 1958.

Experiences with Cage-birds

Sir,—I was most interested in the article "Experiences with Cage-birds" in this week's VETERINARY RECORD, but I would like to refer to the findings of the author on the treatment of scaly face and scaly leg in budgerigars.

I see an average of 80 to 100 budgerigars a month, and of these some 15 to 20 may be found to be suffering with scaly face. All cases, regardless of the severity of the infection or the age of the bird, are treated with an acriflavine emulsion. This substance is quite harmless to the bird and can be applied round the nostrils, eyes, and beak (where the most severe lesions occur) without fear of toxicity or need for special care.

The owner is directed to massage the emulsion thoroughly into and around the lesions and it is found that within 3 days the "scales" begin to crumble away. Treatment is carried out daily for the first week and on alternate days for the second week. At the end of this time the condition has cleared.

Over a period of 2 years, during which time I have followed up the history of many of these cases, I have found no recurrence of the disease after this short, safe, and easy course of treatment.

Yours faithfully,
(Mrs.) E. D. JOERIN.

Thistledene,
Old Lane Gardens,
Cobham,
Surrey.
February 9th, 1958.

ADVERTISERS' ANNOUNCEMENTS

BURROUGHS WELLCOME & CO. announce that "Wellcome" brand Leptospira Canicola Vaccine (Veterinary), for the active immunisation of dogs against Canicola disease, is now issued under the trade mark "Leptovax," in bottles of 3 c.c. The Company also announce that "Wellcome" brand Ringworm Ointment (Veterinary) is now issued under the trade mark "Sporodyl" in jars of 45 grammes and 250 grammes.

EVANS MEDICAL SUPPLIES LIMITED anounce the development and availability of a new product, an Improved Lamb Dysentery Vaccine, capable of stimulating in ewes a high level of active immunity against *Cl. welchii* types B and D in a dose of 2 c.c.

GLAXO LABORATORIES LTD. announce the introduction of Predsolan (prednisolone for the treatment of acetonaemia). It is available in a 10-c.c. vial containing 10 mg. of prednisolone per c.c.

The same company announce the introduction of a 500-c.c. pack, specially designed for multi-dose syringes, of Saffelin (a toxoid for the prevention of pulpy kidney disease in sheep). A 50-c.c. pack of Saffelin is already on the market.

DISEASES OF ANIMALS ACT, 1950—GREAT BRITAIN
Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period		Anthrax	Atrophic Rhinitis	Foot-and-Mouth	Fowl Pest	Sheep Scab	Swine Fever
1st to 15th January, 1958		7	—	15	75	—	48
Corresponding period in	1957	15	—	9	58	—	30
	1956	17	—	—	73	—	30
	1955	34	—	—	40	—	38

Foot-and-mouth disease adjusted figures: outbreaks confirmed 16th to 31st December, 1957, 19; animals slaughtered, 3,220; oubreaks confirmed 1st January to 31st December, 1957, 184; animals slaughtered, 30,432.

TUBERCULOSIS (ATTESTED HERDS) SCHEMES

The number of Attested Herds, *i.e.*, herds officially certified as free from Tuberculosis as at 31st December, 1957, was as follows:—

ENGLAND	WALES	SCOTLAND	TOTAL (GREAT BRITAIN)
106,893	36,451	42,199	185,543

TUBERCULOSIS ORDER OF 1938

The number of bovine animals slaughtered under the Tuberculosis Order of 1938 during the period 1st October to 31st December, 1957, was 185.